

False Position

* The user will need to be sure that the function is continuous on the interval.

- 1) Ask the user for a function, the tolerance, and the max number of iterations
- 2) Ask the user for the values A and B, which will be the values of the initial interval.
- 3) We create a variable i to count the number of iterations. We begin with 1.
- 4) We evaluate A and B in the function to obtain $f(A)$ and $f(B)$. If $f(A) * f(B) = 0$, tell the user that this is the root
- 5) We do a conditional to begin the execution of the method: if $f(A) * f(B) \leq 0$ then execute... to verify that in the interval there is a root. In the case that there is not then tell the user that in this interval there is no root.
- 6) $\text{Error} = |A - B|$
- 7) We find the middle value of the interval. $M = A - (f(A) * (A - B)) / (f(A) - f(B))$ and evaluate in the function to obtain $f(M)$
- 8) Cycle: while the error $>$ tolerance, $i <$ max number of iterations, $f(M) \neq 0$, $f(A) * f(B) < 0$, do:
 - a) If $f(A) * f(M) < 0$
 - (i) $B = M$
 - (ii) $f(B) = f(M)$
 - (iii) $M = A - (f(A) * (A - B)) / (f(A) - f(B))$
 - (iv) $f(M)$ = evaluate the new M in the function
 - (v) $i = i + 1$
 - (vi) $\text{Error} = |A - B|$
 - b) If $f(B) * f(M) < 0$
 - (i) $A = M$
 - (ii) $f(A) = f(M)$
 - (iii) $M = A - (f(A) * (A - B)) / (f(A) - f(B))$
 - (iv) $f(M)$ = evaluate the new M in the function
 - (v) $i = i + 1$
 - (vi) $\text{Error} = |A - B|$
- 9) If the error \leq tolerance, tell the user that the root is in the interval $[A, B]$ (with the final value) with an error of : ____ (with the final value of the error)
- 10) If $f(M) = 0$ tell the use that M is the root.
- 11) If $i =$ max number of iterations, tell the user that he has reached the limit of the given iterations and the root is in the interval $[A, B]$ (with the final values) with an error of: ____ (with the final error value)